Key Issues for Industry GHG Benchmarking

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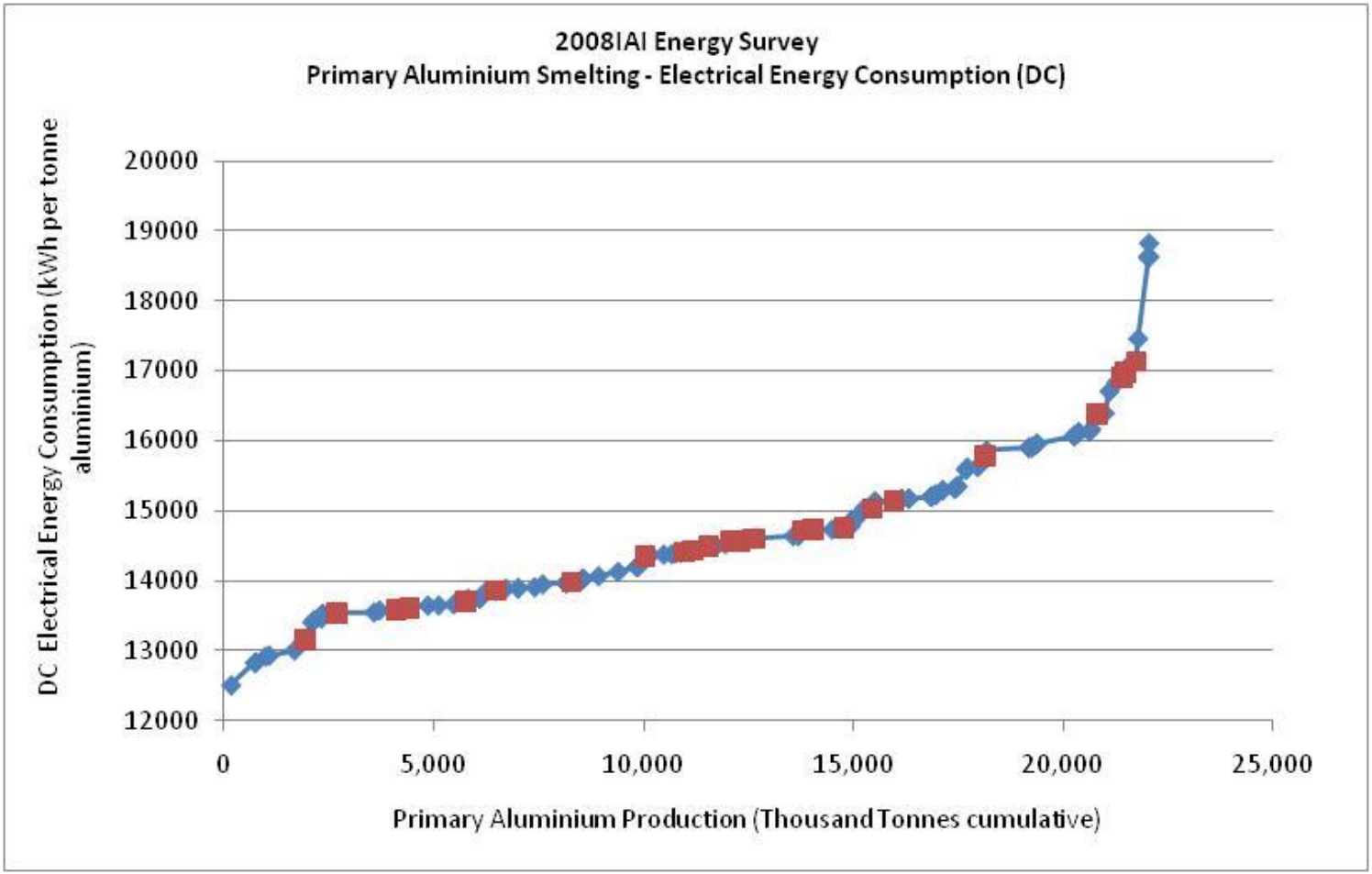
Afternoon Panel Objectives

Address the following questions:

- What are the benefits and challenges of developing and applying benchmarks for industry?
- What data constraints limit benchmarking and how might they be overcome?
- At what level of detail / disaggregation are benchmarks helpful or needed?
- How do responses to these questions differ depending on how benchmarks are used?
- What other information and perspectives are important for Washington State to consider in developing industry benchmarks?

Example of Industry Benchmarking



Benefits and Challenges to Industry

Benefits

- Drive process and energy improvements
- Set achievable objectives
- Etc.

Challenges

- Time and expense of data gathering, analysis, review, & communications
- “Apples” vs. “Oranges”

Clear Reporting Guidelines - Example

PFC EMISSIONS FROM PRIMARY ALUMINIUM SMELTING **IAI FORM PFC001**

Reporting Guidelines

1. Data are reported by technology category and, preferably, by potline. Data for different technology categories should not be mixed.

2. If anode effect data are not available then data for technology category, cell technology, feed type, primary aluminium production and average number of cells operating per day are still reported. Anode effect frequency data should be reported, if available, even though anode effect duration or overvoltage data are not available.

3. Technology category is reported as:
   a. PFPB - where cell technology is Centre Worked Prebake with a Point Feed System.
   b. CWPB - where cell technology is Centre Worked Prebake with a Bar Break Feed System.
   c. SWPB - where cell technology is Side Worked Prebake.
   d. HSS - where cell technology is Horizontal Stud Søderberg.
   e. VSS - where cell technology is Vertical Stud Søderberg.

4. Cell technology is the particular cell technology used (RA-300, SY300, AP18, Reynolds P19 etc.)

5. Potline number is the reference number or letter used to identify the potline. If data from two or more potlines are combined, then all relevant reference numbers or letters relating to the combined data are shown.

6. Feed type is reported as:
   a. PF - where a Point Feed System is applied to Prebake or Søderberg technologies.
   b. BF - where a Bar Break Feed System is used.
   c. SF - where a manual Side Feed System is used.

7. Primary aluminium production is molten (liquid) aluminium as tapped from the pots. It is reported in tonnes (metric tons) and is that production relevant to the anode effect and cell technology type data being reported.

8. Anode effect measurements are reported to two decimal places if possible. If the reported average anode effect duration is estimated, then this is indicated by adding the letter "E" against the reported figure. When data from two or more potlines are combined, the reported average anode effect frequency, average anode effect duration and averaged anode effect over-voltage are production-weighted averages.

9. Averaged anode effect over-voltage in millivolts is only reported for Alcan Pechiney cell technology types AP18, AP30, growth versions of these two cell technologies (e.g. AP33, AP35) and applicable Alcan Pechiney technology SWPB (Side Worked Prebake) potlines. Over-voltage can also be reported as integrated anode effect over-voltage in units of mv.day per cell day. Over-voltage is reported as either positive or algebraic according to the following definitions:
   a. Positive Anode Effect Over-voltage is the sum of the product of time and voltage above the pot target operating voltage (corresponding to the target resistance), divided by the time over which the data are collected (hour, shift, day, month etc.).
   b. Algebraic Anode Effect Over-voltage is the sum of the product of time and voltage above and below the pot target operating voltage (corresponding to the target resistance), divided by the time over which the data are collected (hour, shift, day, month etc.).

10. Section 3 is completed only if PFC emissions have been directly measured and the resulting CF_4 emissions coefficient and C_2F6/CF_4 weight fraction are applicable for production for the year being reported (in accordance with the USEPA/IAI *Protocol for Measurement of Tetrafluoromethane (CF4) and Hexafluoroethane (C2F6) Emissions from Primary Aluminum Production* - **http://www.epa.gov/aluminum-pfc/documents/measureprotocol.pdf**. The directly measured emissions, and hence also the calculated emission coefficients, are to take account of both duct and fugitive emissions. Emission rates and emission coefficients are reported to two decimal places.

11. If Anode Effect and PFC Emissions Measurement data (where appropriate) has been verified by a Third Party (e.g. auditor, regulatory authority) then please fill in details of the verifying body (fields a-d). If third party verification of the data has not occurred then please request internal verification of the data submitted by a senior manager and fill in their details in fields (a, b & d).

Enablers and Issues

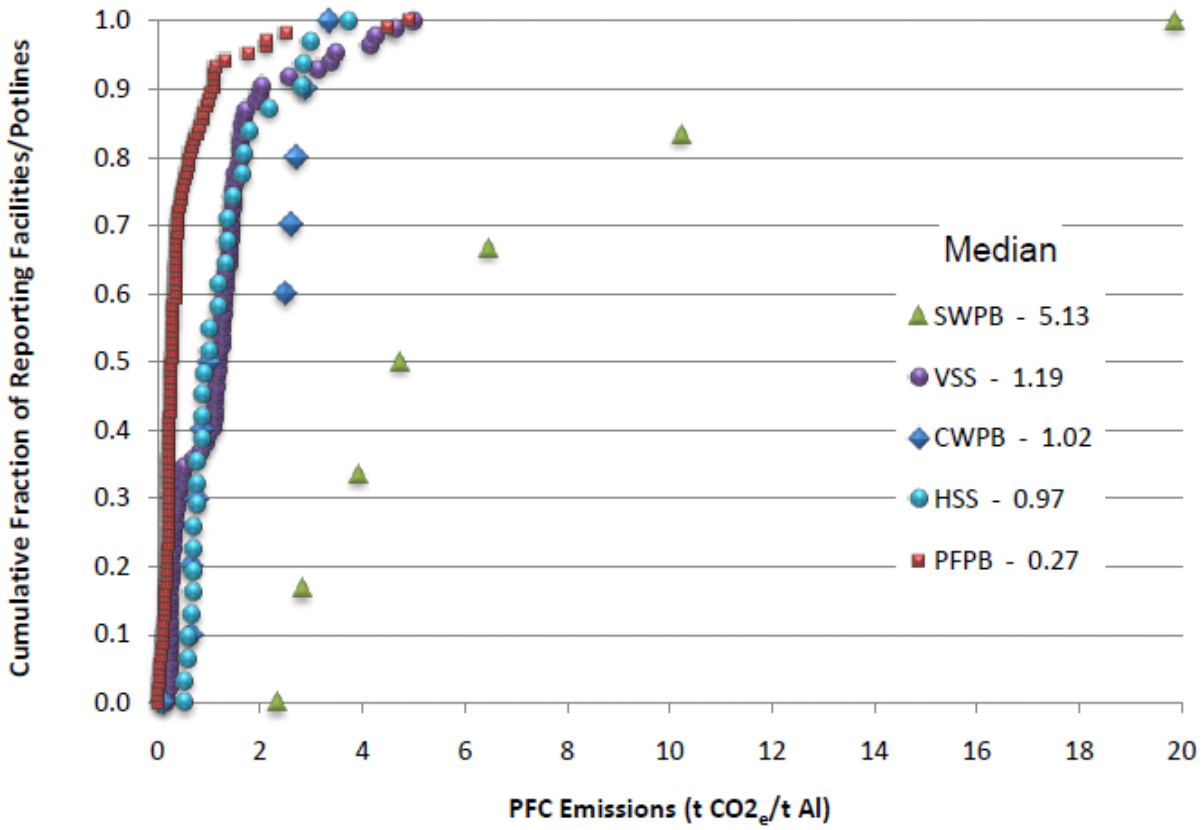
Enablers

- Reporting Guidelines
- Common Boundaries
- Written Industry Specific Protocols

Issues

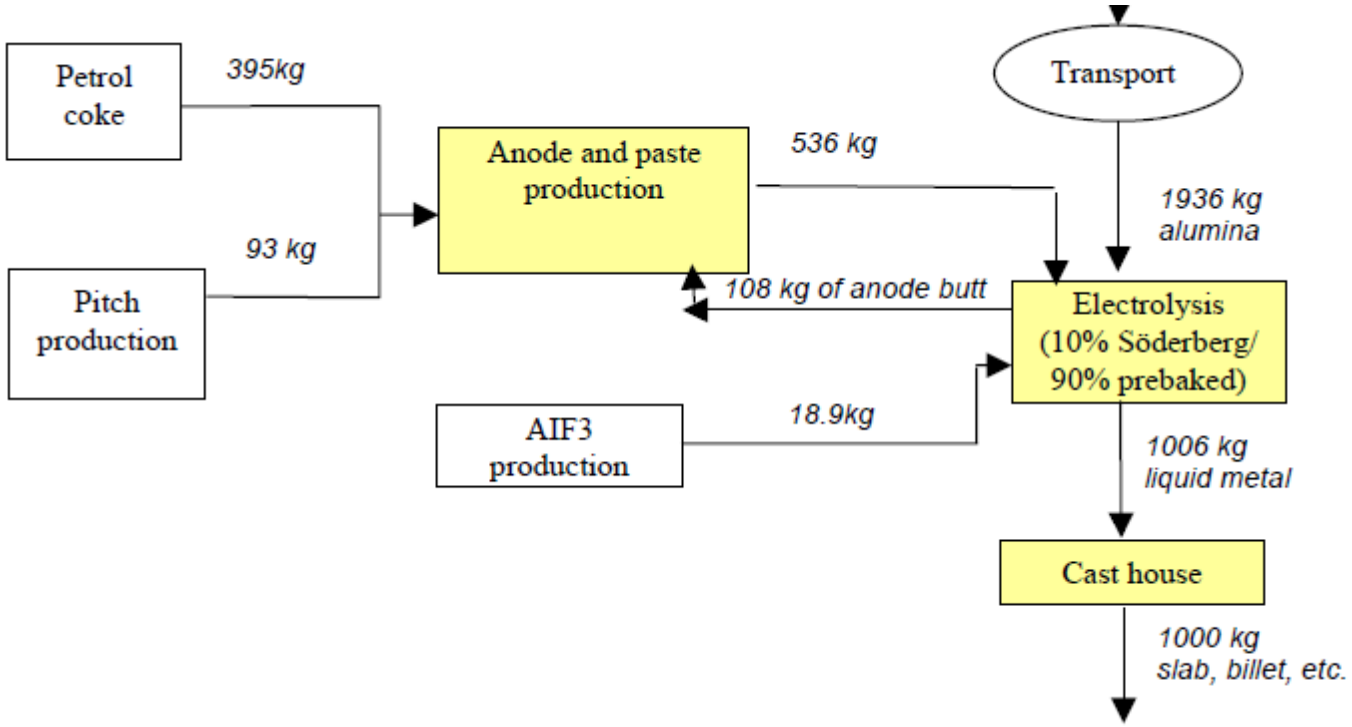
- What is appropriate benchmark subset?
  - World best practice (Worrell)
  - Best in North America? Europe?
  - Best in USA?
  - Best in Washington State?
- Best 10%?, Top quartile?
- Very small sub-sets
- Need to be technology specific

Different Technologies – Different Benchmarks



Level of Detail/ Disaggregation

- Each sub-process in a sector has different emissions
- Not all operators have all of the sub-processes



Conclusion

Also for Discussion Today

- How do responses to these questions differ depending on how benchmarks are used?
- What other information and perspectives are important for Washington State to consider in developing industry benchmarks?